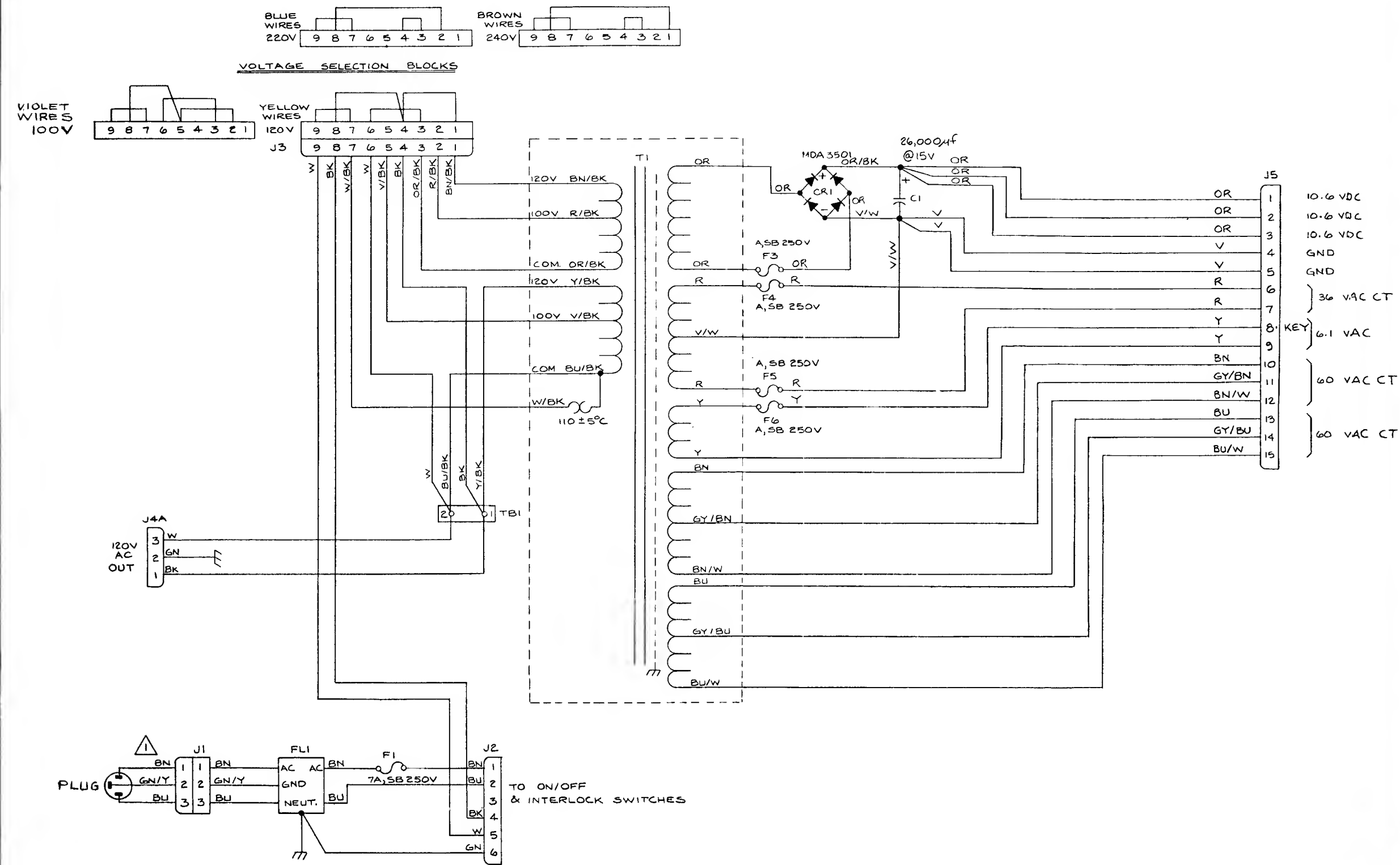
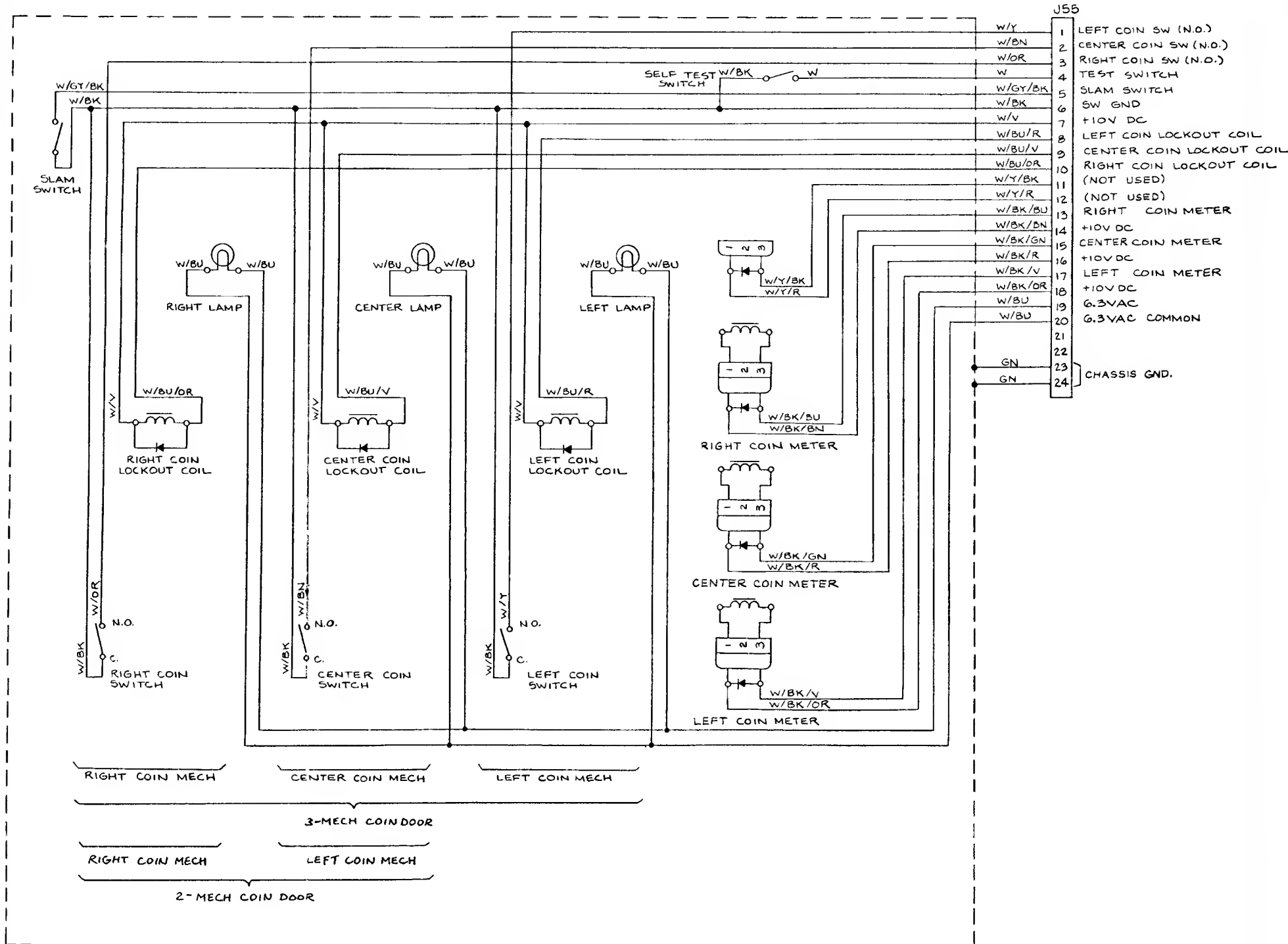


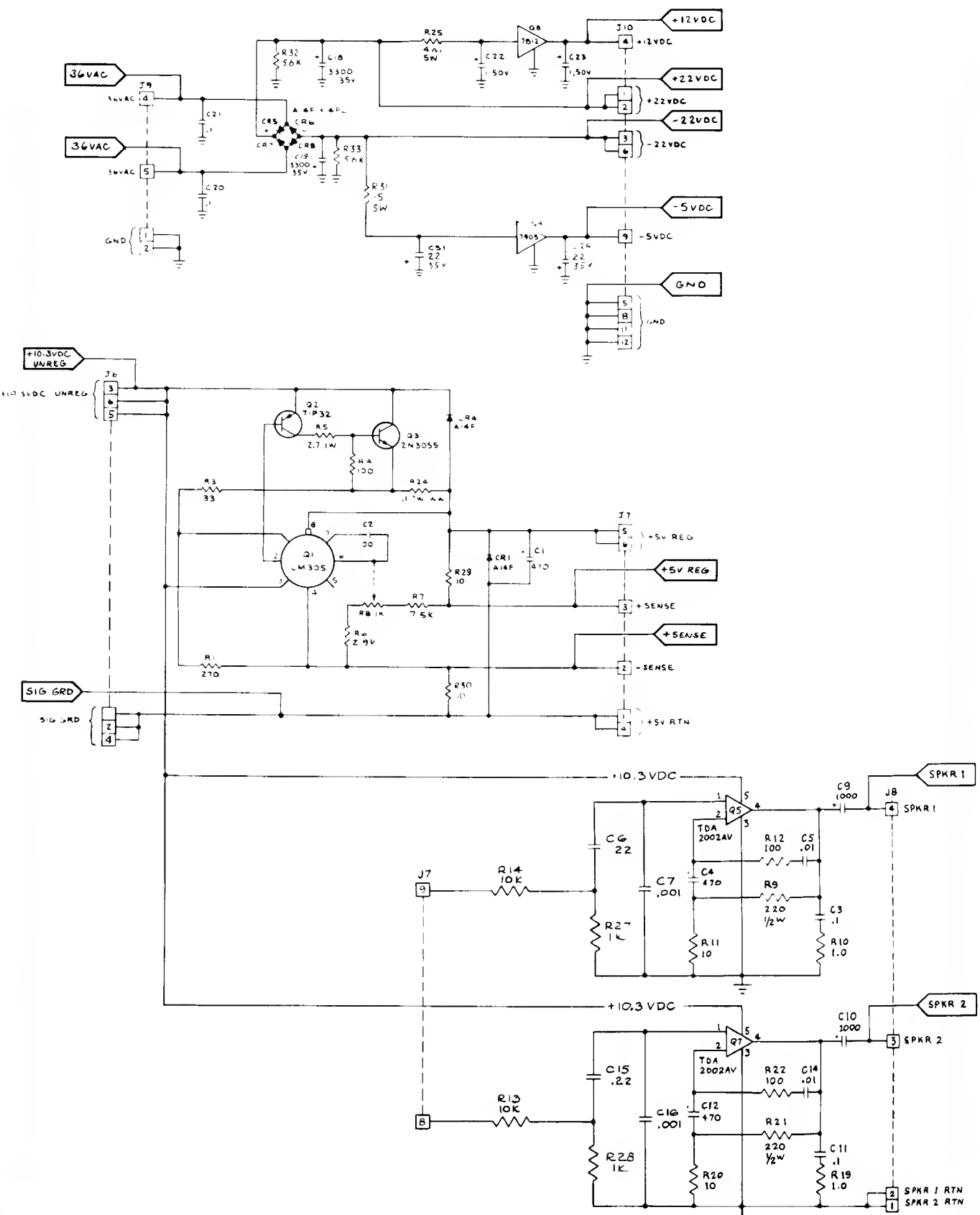
INTERNATIONAL POWER SUPPLY SCHEMATIC (035887-01) A



COIN DOOR SCHEMATIC (034988-01) A



REGULATOR AUDIO II PCB SCHEMATIC (035435-02 C)



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Drawing Package Supplement

to

BATTLEZONE™

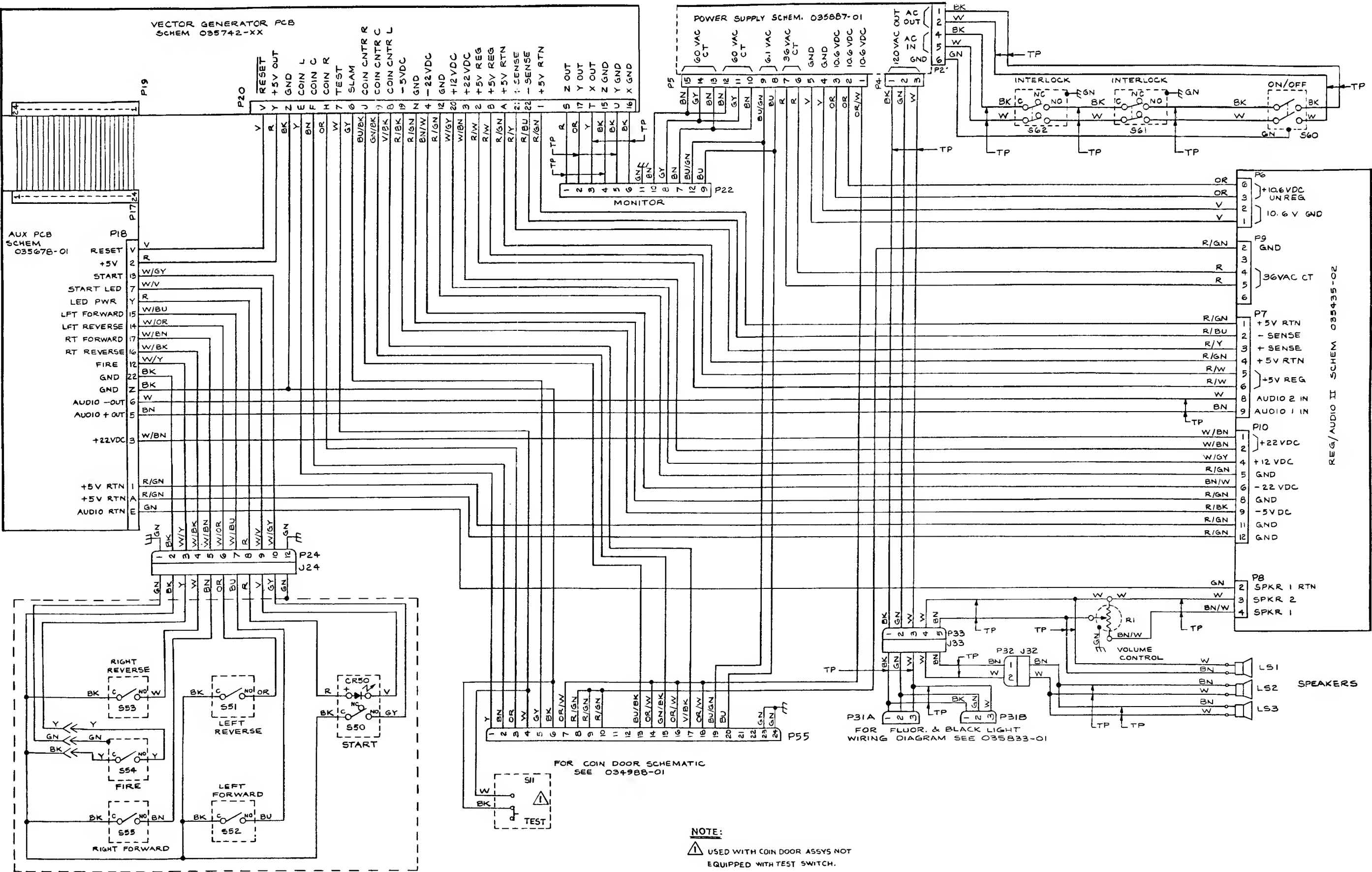
Operation, Maintenance, and Service Manual

Contents of this Drawing Package

Game Coin Door and Power Supply Wiring Diagrams  
Math Box Signature Analysis Procedures  
Microprocessor  
Coin Door Inputs and Analog Vector-Generator Outputs  
Vector-Generator  
Auxiliary PCB Math Box, Switch Inputs and Audio Outputs

Sheet 1, Side A  
Sheet 1, Side B  
Sheet 2, Side A  
Sheet 2, Side B  
Sheet 3, Side A  
Sheet 3, Side B

BATTLEZONE WIRING DIAGRAM (036242-01 C)



The Regulator/Audio PCB has the dual functions of  
regulating the +5 VDC logic power to the game PCB and  
amplifying the audio from the game PCB.

Regulator Circuit

The regulator consists of voltage regulator Q1, current  
source power transistor Q3 and Q3's bias transistor Q2. The  
regulator accurately regulates the logic power input to the  
game PCB by monitoring the voltage through high im-  
pedance inputs +SENSE and -SENSE. The inputs are  
directly from the +5 VDC and ground inputs to the game  
PCB. Therefore, the regulator regulates the voltage on the  
game PCB. This eliminates a reduced voltage due to IR  
buildup on the wire harness between the regulator and the  
game PCB. Variable resistor R8 is adjusted for the +5 VDC  
on the game PCB. Once adjusted, the voltage at the input of  
the game PCB will remain constant at this voltage.

Regulator Adjustment

1. Connect a voltmeter between +5 V and GND test points  
of the game PCB.
2. Adjust variable resistor R8 on the Regulator/Audio PCB  
for +5 VDC reading on the voltmeter.
3. Connect a voltmeter between +5 V REG and GND on  
the Regulator/Audio PCB. Voltage reading shall not be  
greater than +5.5 VDC. If greater, try cleaning edge  
connectors on both the game PCB and the  
Regulator/Audio PCB.
4. If cleaning PCB edge connectors doesn't decrease  
voltage difference, connect minus lead of voltmeter to  
GND test point of Regulator/Audio PCB and plus lead to  
GND test point of game PCB. Note the voltage. Now  
connect minus lead of voltmeter to +5 REG test point  
on Regulator/Audio PCB and plus lead to +5 V test  
point on game PCB. From this you can see which  
harness circuit is dropping the voltage. Troubleshoot  
the appropriate harness wire or harness connector.

Audio Circuit

The audio circuit contains two independent audio  
amplifiers. Each consists of a TDA2002AV amplifier with a  
gain of ten.

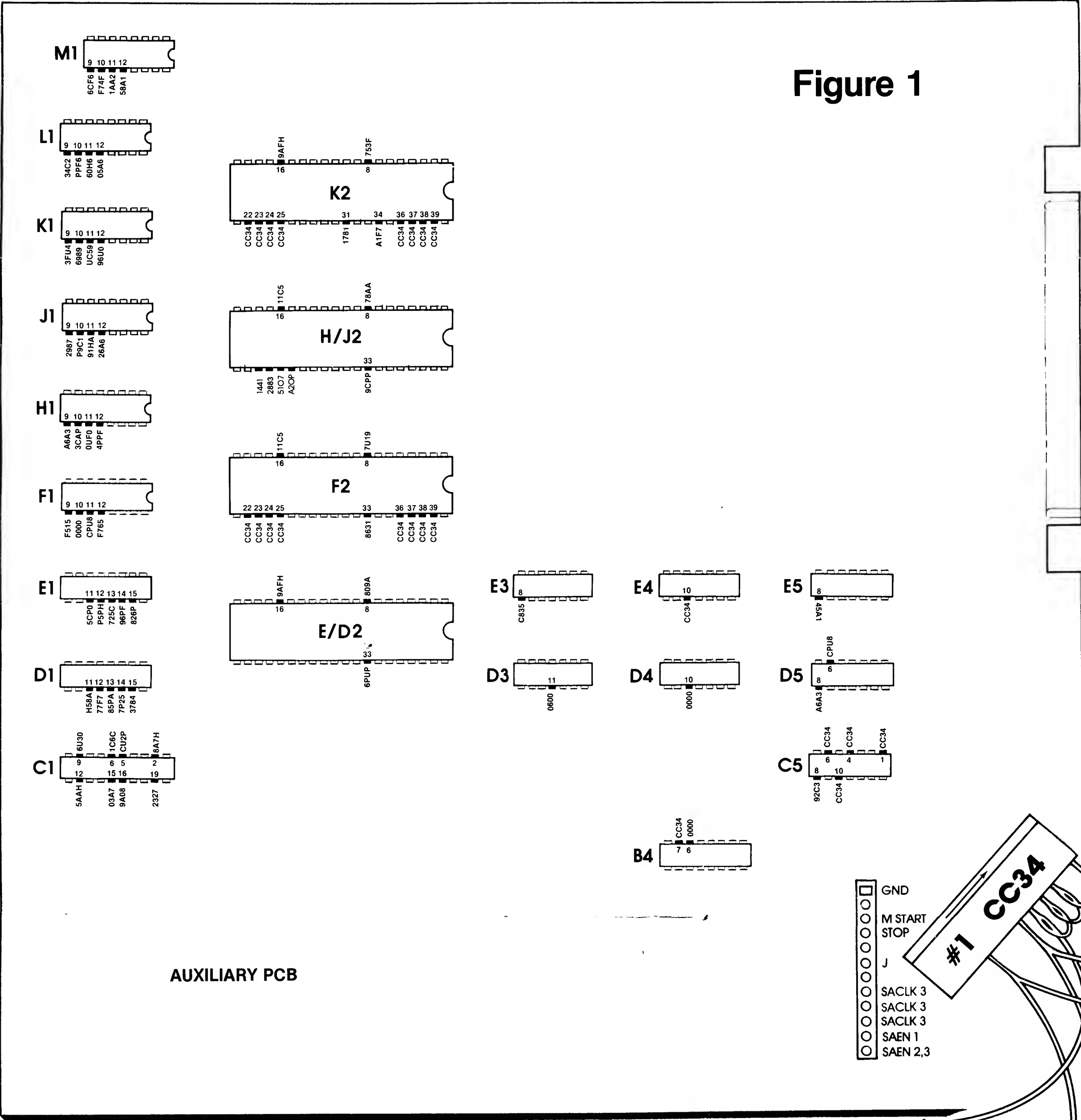


Figure 1

The Auxiliary PCB Math Box Circuitry

The Math Box Circuitry of the Battlezone Auxiliary PCB is connected to the Analog Vector-Generator PCB via the PCB harness interconnector. The Math Box Circuitry receives addresses EAB0 thru EAB4 (external address bus 0 thru 4) and provides data EDB0 thru EDB7 that results in the three-dimensional video of the Battlezone™ game.

A second connector on the Auxiliary PCB connects the control signals of the signature analyzer (SA). This header accepts a special harness connector that makes signature analysis extremely easy.

Signature Analysis of the Math Box Circuitry

During the self-test procedure, the Math Box Circuitry is quizzed. T displayed in the upper right-hand corner of the self-test video display indicates that the Math Box Circuitry does not answer the question in the amount of time expected. Therefore, a T indicates a Math Box Circuitry failure.

Due to the complexity of this circuitry, we offer signature analysis as a simple means of isolating failing circuits. Signatures for this circuitry are presented in two forms:

- 1) at the actual test points in the Auxiliary PCB Math Box Circuitry schematic diagram (on Sheet 3, Side B), and
- 2) for your convenience, on the detail drawing of the Auxiliary PCB to the left of this text.

Since the Analog Vector-Generator PCB must be connected to the Auxiliary PCB, you may take signatures while the PCBs are installed in the game.

The following is the procedure for signature analysis of the Math Box Circuitry of the Auxiliary PCB:

A. Equipment Required:

1. Signature Analyzer (one of the following):  
Atari C•A•T Computer-Assisted Troubleshooter. This is a signature analyzer and a RAM/ROM tester combined. For more information contact Atari, Inc., Field Service/Coin-Op Division, P.O. Box 427, Sunnyvale, CA 94086.

OR

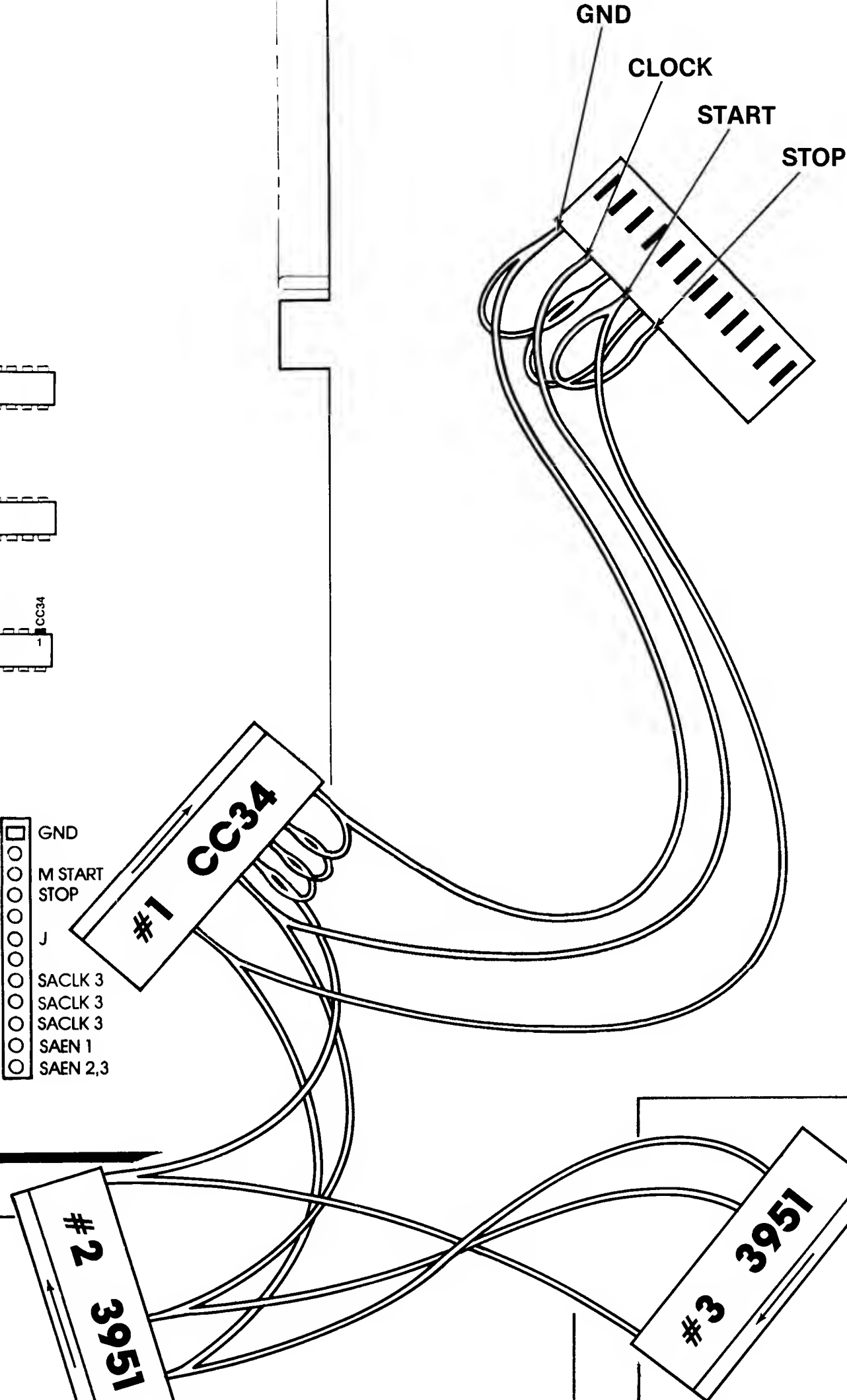
Kurz-Kasch Signature II signature analyzer. For more information contact Kurz-Kasch, 711 Hunter Drive, Wilmington, Ohio 45117.

OR

Hewlett-Packard Model 5004A signature analyzer. For more information contact Hewlett-Packard, Scientific Instruments Div., 1501 Page Mill Road, Palo Alto, CA 94304.

For local dealers, check the Yellow Pages under "Electronic Equipment and Supplies."

Figure 3



PORTION OF  
AUXILIARY PCB

Figure 2A

PORTION OF  
AUXILIARY PCB

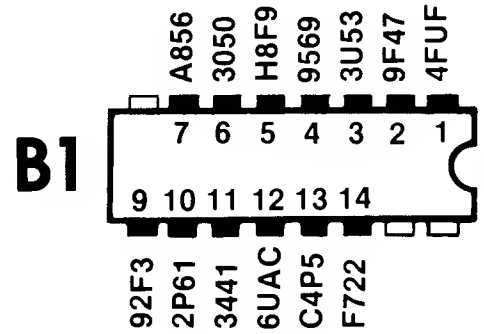
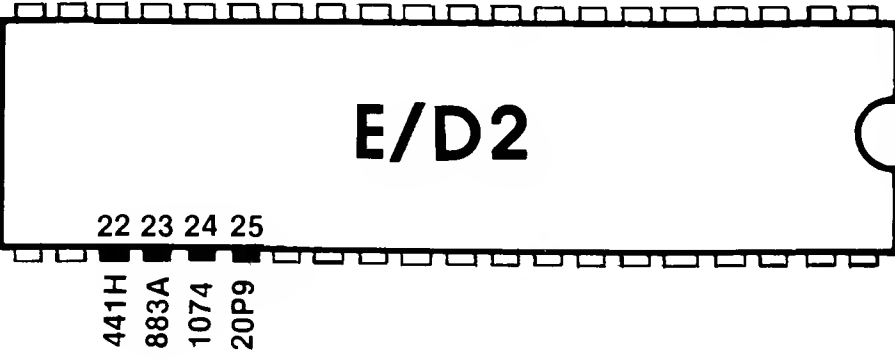
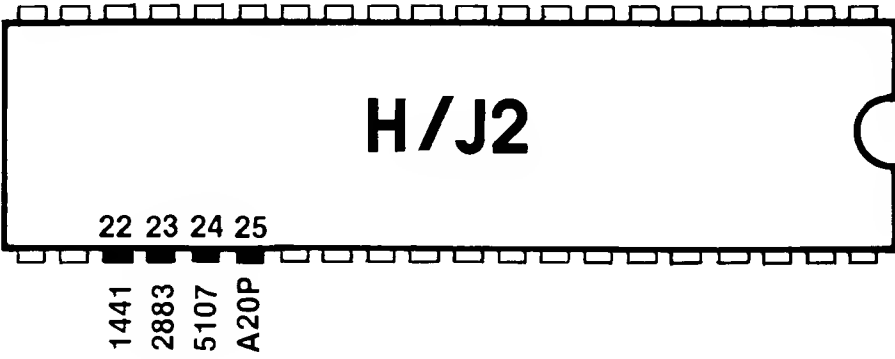
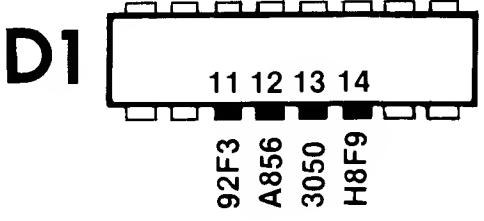
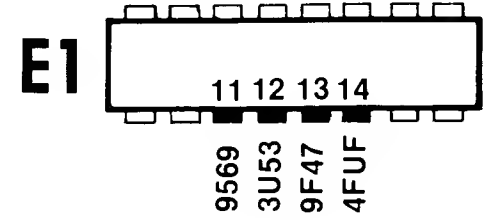
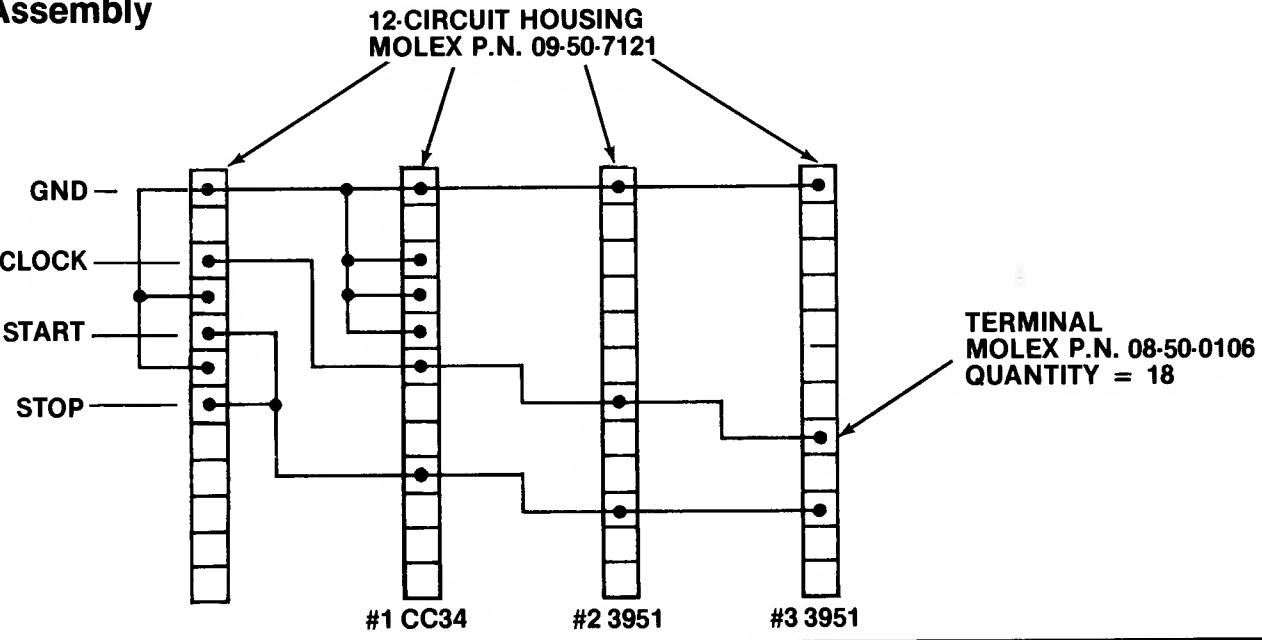


Figure 2B

PORTION OF  
AUXILIARY PCB



S.A. Harness Assembly





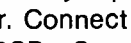
2. SA Harness Assembly:  
Atari part number A036836-01. You can make one of these yourself. Above is an illustration of its construction.
3. Three jumper wires with "hook" connectors on each end.
4. Pullup resistor as follows: 1K to 1.5K ohm, ¼ watt resistor.

B. Signature Analysis Setup Procedure

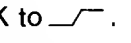
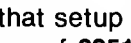
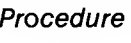
1. Connect Signature Analyzer to the matching pins of SA connector on the SA Harness assembly. In other words, GND should match up with GND, etc.
2. Set Self-Test Switch of Battlezone™ game to ON. After approximately three seconds, the TV monitor should display the self-test pattern.
3. Jumper top end of 1K-ohm resistor R129 (located immediately between and below C [center] and L [left] COIN test points) of Analog Vector-Generator PCB to ground five times, or until video display is blank. You will hear a short beep after the 5th grounding; also, the screen will display only a tiny dot in its center. **NOTE:** To avoid accidentally turning off the game by brushing against the interlock switch, we recommend putting tape over the switch.

**Alternate:** Jumper pin 5 of Analog Vector-Generator PCB edge-connector J20 to ground five times, or until video display is blank.


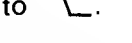
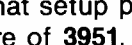
C. Signature Analysis Test #1 Procedure

1. Plug SA Harness Assembly Test #1 connector onto Signal Analyzer header on Auxiliary PCB (the black wire on the connector should be at the top).
2. Connect a jumper between pin 1 of IC B6 on the Analog Vector-Generator PCB and ground. This places a continuous RESET to the microprocessor on the Analog Vector-Generator PCB.
3. Set Signature Analyzer START to , STOP to , and CLOCK to .
4. Connect a jumper wire to each end of a 1K to 1.5K-ohm resistor. Connect one jumper wire to +5V test point on Auxiliary PCB. Connect other jumper wire to the tip of the Signature Analyzer probe.
5. Verify that setup procedure was correct by probing (touching probe to) the +5V test point. The Signature Analyzer should indicate CC34. If not CC34, remove the jumper from pin 1 of IC B6. Return to B. *Signature Analysis Setup Procedure* and once again do step 3. If +5V is CC34, refer to G. *Isolating a Failing Circuit*.
6. Probe for signatures as shown in Figure 1 to the left. If all signatures are correct, continue with D. *Signature Analysis Test #2A Procedure*. If any signatures are incorrect, probe for signature of CC34 on +5V test point. If not CC34, remove jumper from pin 1 of IC B6. Return to B. *Signature Analysis Setup Procedure* and once again do step 3. If +5V is CC34, refer to G. *Isolating a Failing Circuit*.


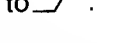
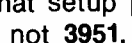
D. Signature Analysis Test #2A Procedure

1. Remove 1K to 1.5K-ohm jumper wire from Signature Analyzer probe.
2. Plug SA Harness Assembly Test #2 connector onto Signature Analyzer header on Auxiliary PCB.
3. Remove jumper from pin 1 of IC B6 on the Analog Vector-Generator PCB.
4. Set Signature Analyzer START to , STOP to , and CLOCK to .
5. Verify that setup procedure was correct by probing +5V for a signature of 3951. If not 3951, return to B. *Signature Analysis Setup Procedure* and once again do step 3. If +5V is CC34, refer to G. *Isolating a Failing Circuit*.
6. Probe for signatures as shown in Figure #2A to the left. If all signatures are correct, continue with E. *Signature Analysis Test #2B Procedure*. If a signature is incorrect, refer to G. *Isolating a Failing Circuit*.

E. Signature Analysis Test #2B Procedure

1. Make sure the SA Harness Assembly Test #2 connector is plugged onto Signature Analyzer header on Auxiliary PCB.
2. Make sure jumper is removed from pin 1 of IC B6 on the Analog Vector-Generator PCB.
3. Set Signature Analyzer START to , STOP to , and CLOCK to .
4. Verify that setup procedure was correct by probing +5V for a signature of 3951. If not 3951, return to B. *Signature Analysis Setup Procedure* and once again do step 3, then return to this step.
5. Probe for signatures as shown in Figure #2B to the left. If all signatures are correct, continue with F. *Signature Analysis Test #3 Procedure*. If a signature is incorrect, refer to G. *Isolating a Failing Circuit*.

F. Signature Analysis Test #3 Procedure

1. Plug SA Harness Assembly Test #3 connector onto Signature Analyzer header on Auxiliary PCB.
2. Make sure jumper is removed from pin 1 of IC B6 on the Analog Vector-Generator PCB.
3. Set Signature Analyzer START to , STOP to , and CLOCK to .
4. Verify that setup procedure was correct by probing +5V for 3951. If not 3951, return to B. *Signature Analysis Setup Procedure* and once again do step 3, then return to this step.
5. Probe for signatures as shown in Figure #3 to the left. If all signatures are correct, then Math Box Circuitry of Analog Vector-Generator PCB is OK.

G. Isolating a Failing Circuit

If you find an incorrect signature, find the signature test point of the Math Box Circuitry on Sheet 3, Side B. Locate the IC from which the signature is being output. Check all inputs of that IC.

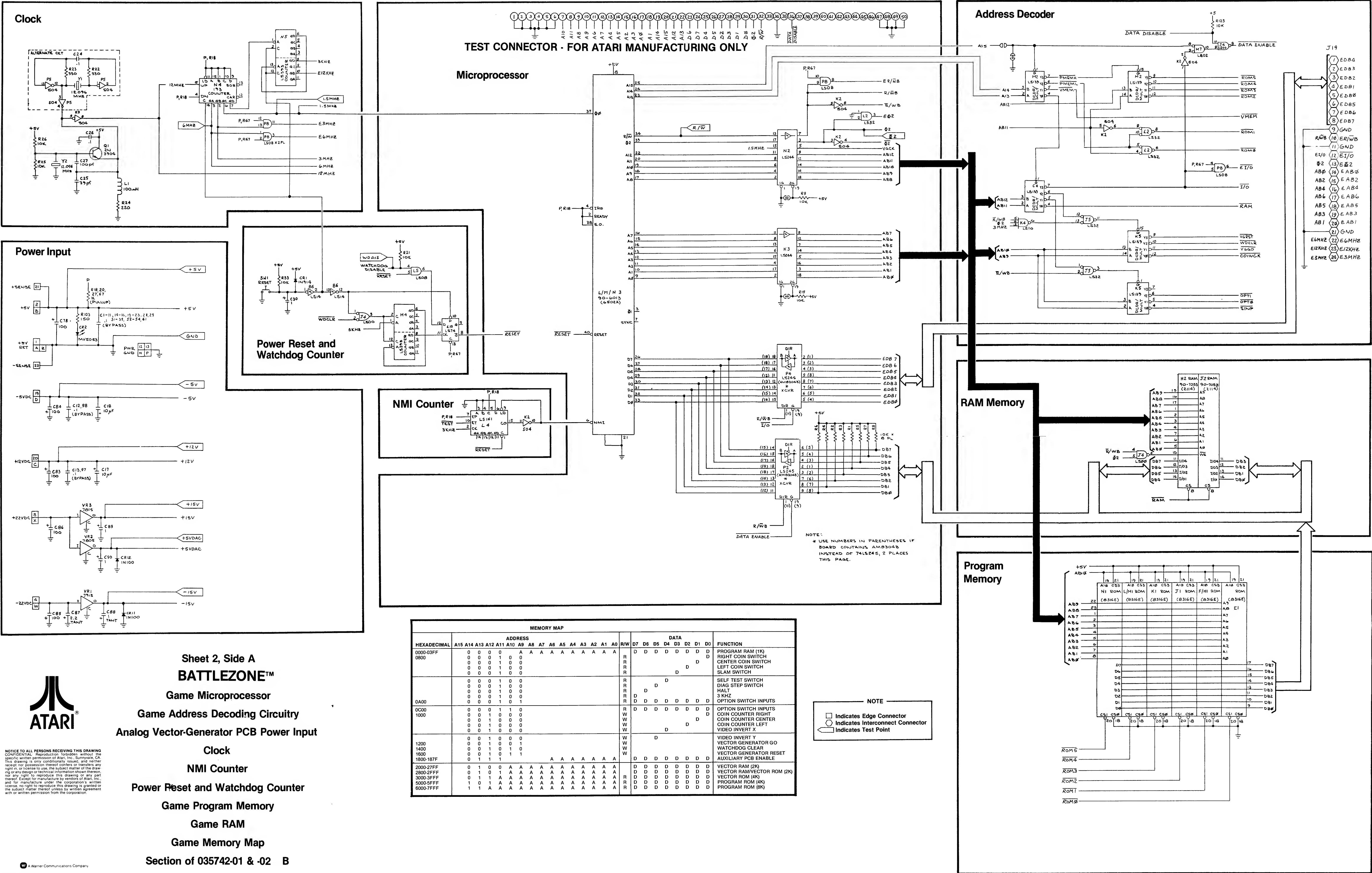
**If all input signatures are correct:** Remove the Auxiliary PCB from the circuit. Check the circuit traces common to the failing IC pin on both the top and bottom of the PCB for shorts to another circuit trace. If the circuit traces are not shorted, then replace the failing IC.

**If an input signature is incorrect:** Locate on the schematic the IC source of the failing signature. Check the input signatures of that IC. If all input signatures are correct, then that is the failing IC. If this IC has a failing input signature, then continue "upstream" in the circuit flow until the failing IC is isolated.

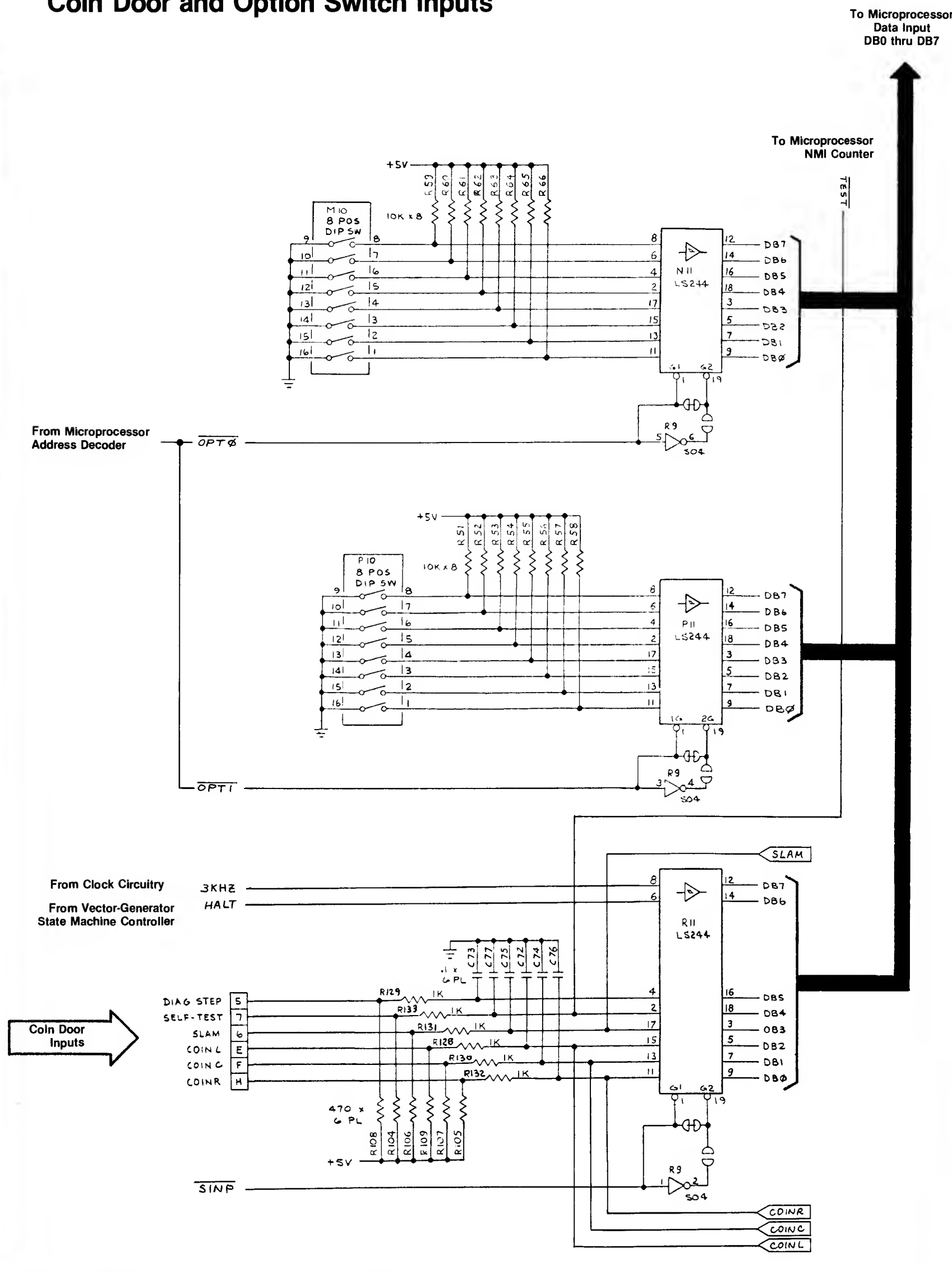
  
Sheet 1, Side B  
**BATTLEZONE™**

Auxiliary PCB  
Signature Analysis Procedure  
Section of 035678-01 B

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## Coin Door and Option Switch Inputs



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Sheet 2, Side B  
**BATTLEZONE™**

Analog Vector-Generator PCB

Switch Inputs

Analog Vector-Generator PCB

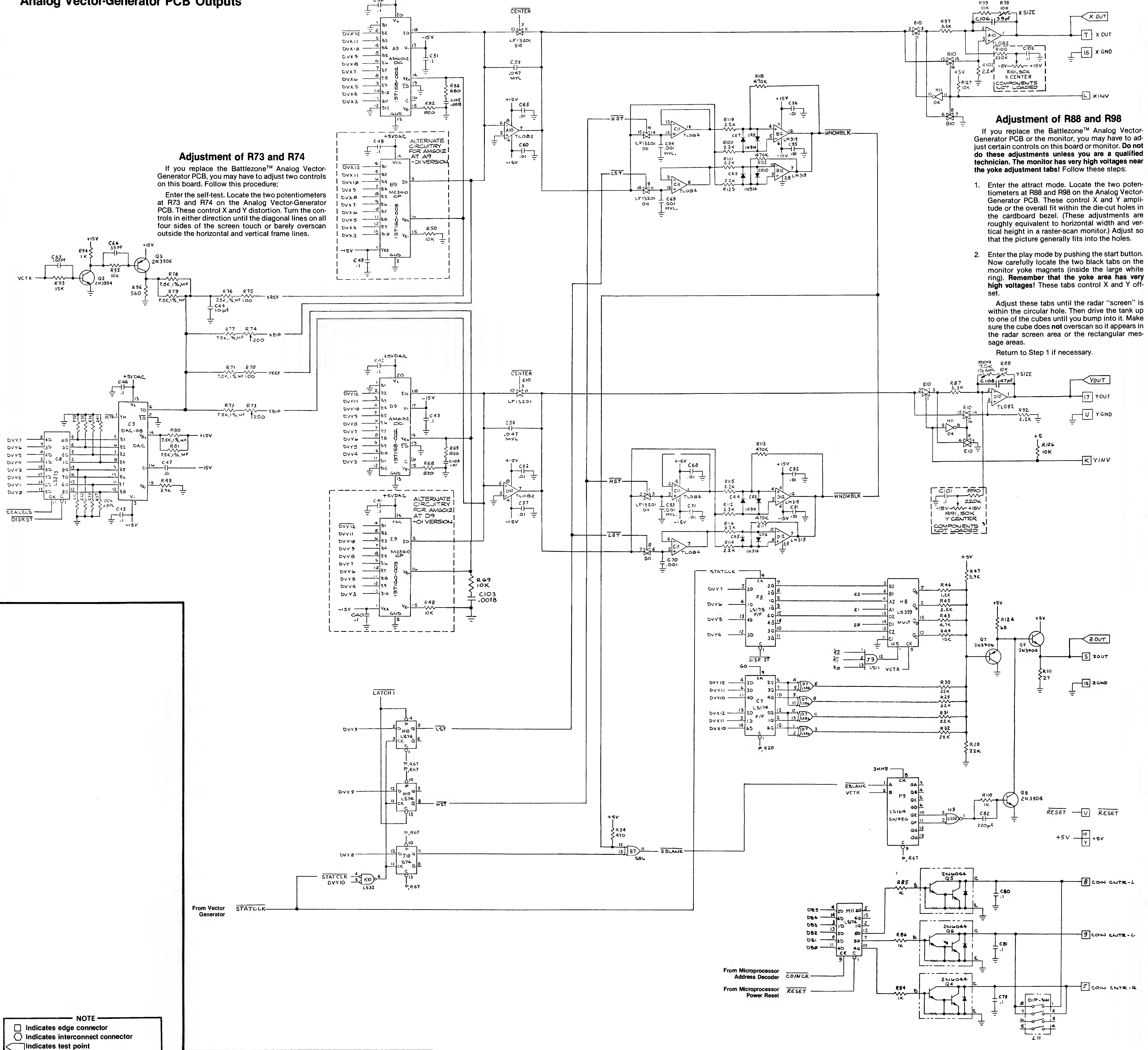
Video Output

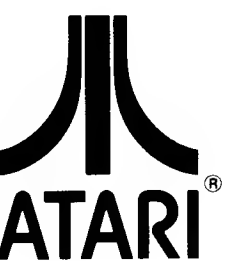
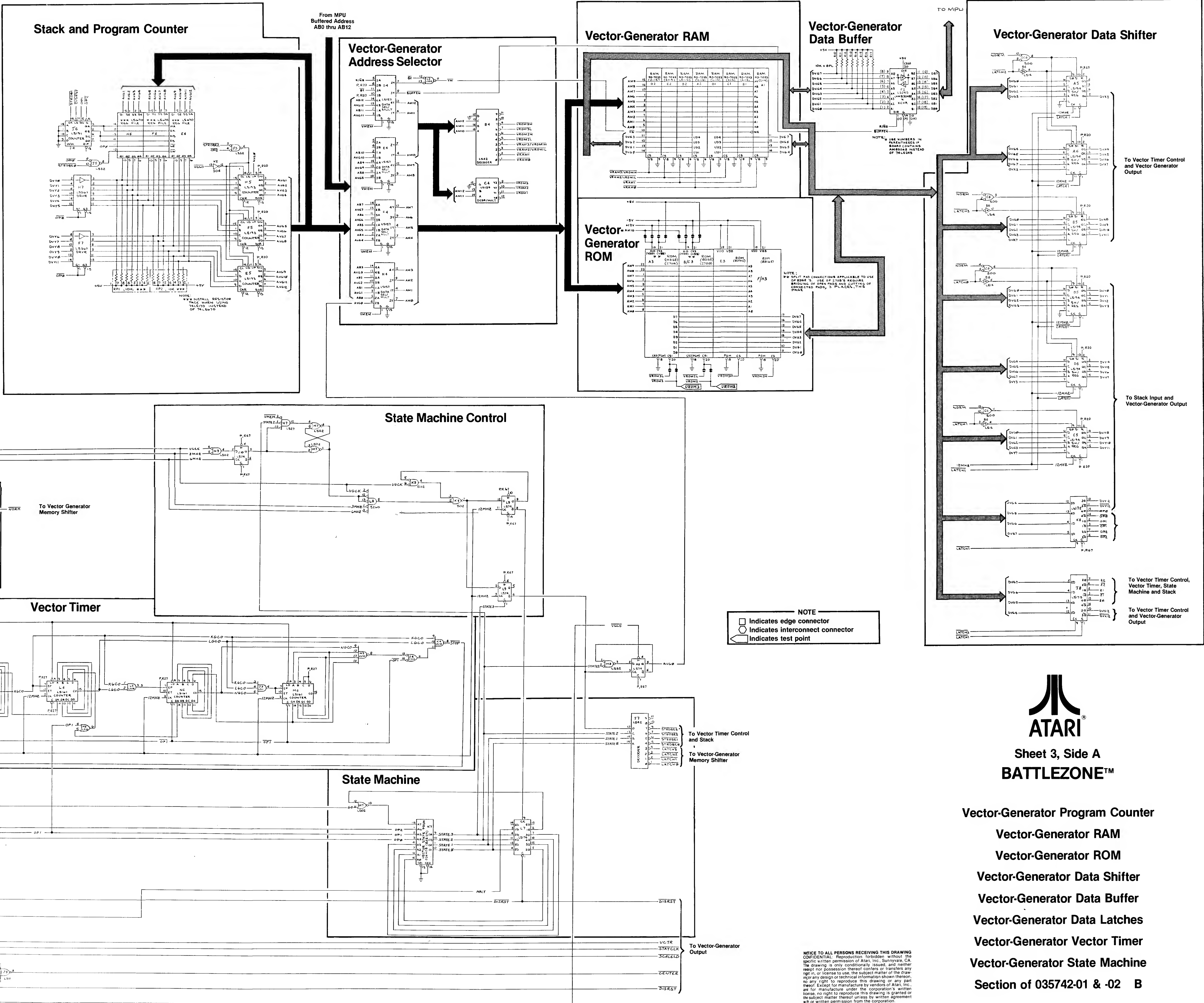
Analog Vector-Generator PCB

Coin Counter Output

Section of 035742-01 & -02 B

## Analog Vector-Generator PCB Outputs



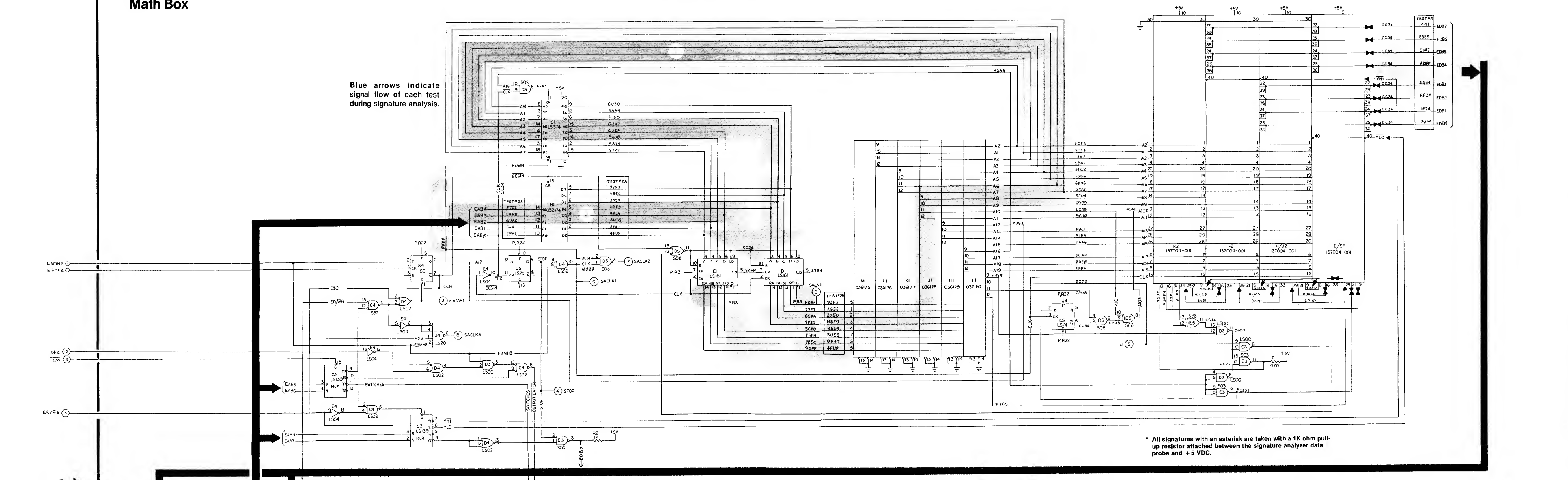


Sheet 3, Side A  
BATTLEZONE™

Vector-Generator Program Counter  
Vector-Generator RAM  
Vector-Generator ROM  
Vector-Generator Data Shifter  
Vector-Generator Data Buffer  
Vector-Generator Data Latches  
Vector-Generator Vector Timer  
Vector-Generator State Machine  
Section of 035742-01 & -02 B

## Math Box

Blue arrows indicate signal flow of each test during signature analysis.



\* All signatures with an asterisk are taken with a 1K ohm pull-up resistor attached between the signature analyzer data probe and +5 VDC.

## Output Latch

## Audio Output

## Control Panel Inputs and Audio Generator

### Adjustment of R11

If you replace the Battlezone™ Auxiliary PCB, you may have to adjust one control on this board. Follow this step:

Enter the play mode. Listen to the tank idle sound: it should be a moderate speed—not too slow (as in an engine about to stall) or too fast.

Adjust the potentiometer at R11 on the Auxiliary PCB. This resistor is just about in the center of the PCB. Also check that the idle speed is properly adjusted by driving the tank forward: the motor speed should increase.

**NOTE**  
 □ Indicates edge connector  
 ○ Indicates interconnect connector  
 ◀ Indicates test point  
 Four-digit alphanumeric numbers are signatures of Math Box test points.  
 Unboxed signatures are taken during Test #1.



Sheet 3, Side B  
**BATTLEZONE™**

Auxiliary PCB  
 Audio Output  
 Control Panel Inputs  
 Math Box  
 Section of 035678-01 B

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